

2016

## Estimating Short Run and Long Run Coefficients of Fundamentals Factors with Growth and Momentum Factor: Evidence from Emerging Markets

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### Recommended Citation

Shoaib, Adnan and Siddiqui, Muhammad Ayub, Estimating Short Run and Long Run Coefficients of Fundamentals Factors with Growth and Momentum Factor: Evidence from Emerging Markets, *Australasian Accounting, Business and Finance Journal*, 10(4), 2016, 17-37. doi:[10.14453/aabfj.v10i4.3](https://doi.org/10.14453/aabfj.v10i4.3)

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### Keywords

Fama-French, HML, SMB, WML, Market Gearing, Global Financial Crises, Long term relationship, Partial Adjustment Model



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Adnan Shoaib<sup>1</sup> and Muhammad Ayub Siddiqui<sup>2</sup>

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This study examines the long term relationship of risk premium and fundamental factors in emerging stock markets of China, India and Pakistan keeping in view leading contribution of Fama and French (1992) and Carhart (1997) models. Contrary to the macroeconomic multifactor models, this study incorporates firm-specific risk factors related to the market premium; size (SMB), value (HML), momentum (WML) and growth (UMD) as determinants of risk premium. The firm-specific growth factor is incorporated based on evidence from Ho, Strange, and Piesse (2008) by employing (UMD) which is based on assets to market equity of the firm. Sample of 1198 companies from the three emerging markets for the period of 2001-2013 depicts market risk premium as the leading factor affecting risk premium in Indian and the Pakistani markets. Results reveal market momentum being high enough to overestimate coefficients in the short run. However, the relationship is stabilized and adjusted in the long run. Chinese markets, where all the risk factors seem to play their role to determine risk premium, are relatively much stable and grown-up and clearly represent maturity of the Chinese markets. Distinction between the short run and long run might be useful for the investors of the three emerging economies. According to the principle of high risk associated with high returns, small value happens to deliver higher returns with higher volatility. The growth stocks outperform value stocks in these economies.

**JEL Classification:** G10, G30

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## 1. Introduction

Performance of stock markets using stock returns has long been studied by researchers in the area of finance. The first ever explanation of variation in stock returns was given by Black, Jensen, and Scholes (1972), Lintner (1965), and Sharpe (1964) in respect of different versions of the Capital Asset Pricing Model (CAPM). CAPM remained core of discussion among the financial economists for many decades until anomalies of this model were identified. Applicability of sole CAPM in different stock markets in order to measure efficiency through estimation of required rate of return and risk premium has not been a successful experience in various economies. This insufficient explanation of the efficiency of capital markets compelled researchers to include other factors that explain the cross sectional variations in returns other than excess market returns or market risk premium.

Studies<sup>3</sup> have identified many other factors such as size of firms (SMB), book to market equity (HML) and leverage causing variation in stock returns. Fama and French (1993) defined the cross-sectional variation in the average market return as the common risk factor associated with the stock returns. They developed and employed variables such as Small-minus-big (SMB) and High-minus-Low (HML) that explain the cross sectional variation in the stock returns and risk premium of the individual stocks. Over the several years, it is observed that Fama and French model is unable to explain returns if momentum factor occurs. Carhart (1997) developed the momentum effect and extended the Fama and French Model by incorporating momentum factor that explains momentum effect in equity returns. These multifactor models replaced the classical CAPM model that used in the past. They are currently often employed in developed markets in portfolio management, investment performance evaluation and even in legal practice for assessing damages in lawsuits (Mitchell & Netter, 1994). There are considerable empirical evidences identifying size and value effect in developed markets<sup>4</sup> and emerging markets<sup>5</sup>. However, long run adjustment pattern of size, value and momentum effect in equity returns is still disputed territory of multifactor models, specifically in south Asian emerging markets. Moreover, Different empirical studies like Hamada (1972), Masulis (1983), Bhandari (1988), Dimitrov and Jain (2008) and Korteweg (2010) provide diverse evidence on gearing and stock returns in developed markets, but fewer studies in emerging markets have focused on gearing effect and its adjustment in equity returns as price risk factor.

The concept of emerging markets emerged in 1980s that described the countries with specific characteristics like, less industrialized, less developed equity markets, less liquid (Schoenfeld, 2011; Silva & Chávez, 2008), higher transaction cost (Bekaert, Harvey, & Lundblad, 2007; Lesmond, 2005) but having significant growth potential and more intended to economic liberalization (Khanna & Palepu, 2013). Fama and French (1998) indicated that emerging markets have value premium in their stock returns. Additionally, emerging markets require special criterion to deal with their market information because of differential behavior of the stakeholders. This led the researchers to study the emerging economies that have specific characteristics. This study is also targeted towards those emerging markets where investors have had similar behavior and have strong trade ties that are Pakistan, India and China. Pakistan and India are now trying to catch up China in the race of economic growth and process of development.

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<sup>3</sup> Banz (1981), Basu (1977), Stattman (1980), Rosenberg, Reid, and Lanstein (1985) and Bhandari (1988); Fama and French (1992) combined the size and book to market value to capture the cross-sectional variation in the stock returns; Fama and MacBeth (1973) employed similar variables using regression analysis for cross-sectional variation of the average returns; Fama and French (1993) further refined the three factor model.

<sup>4</sup> O'Brien, Brailsford, and Gaunt (2008); Bartholdy, Peare, and Willett (2000); and Lam (2005)

<sup>5</sup> (Cakici, Fabozzi, & Tan, 2013; Lischewski & Voronkova, 2012)

This study attempts to explain the long run adjustment pattern of equity returns under multifactor models. Moreover, this study attempts to explain the impact of gearing effect on equity returns adjustment as price risk factor in emerging markets. This study also incorporates SMB, HML, and WML as the common risk factors in the determination of stock returns. WML representing the trend and momentum<sup>6</sup> of the market built on winning and losing firms is incorporated for momentum risk factor<sup>7</sup>. UMD represents another risk factor related to market gearing, which also depicts the future growth prospects of the firm based on asset-market-equity-ratio in this study (Strong & Xu, 1997). Effort has been made to capture the significance of firm-specific risk factors for risk premium in the emerging markets contrary to the findings of Fama and French (1998). Fama and French (1996) model explains only the rational behavior of pricing<sup>8</sup>. Incorporation of firm-specific growth factors (market gearing) measured through market leverage (UMD) might determine stock returns to an extent. Previous studies provide evidence of linkage of market leverage and stock returns<sup>9</sup> (Strong & Xu, 1997). Market leverage, as defined in the section 3, as the price risk factor is incorporated in this study.

Methodologically this study employs autoregressive models to compare the short-term and long-term relationship of risk premium and firm-specific factors such as market premium, SMB, HML, WML and UMD. The sample of 1198 companies includes 324 companies of KSE, 534 companies of SSE in Shanghai 'A' share Index and 340 companies of BSE from CNX 500 for the period of 2001-2013. The data has been collected from Thomson Reuter DataStream Database for SSE, BSE, and a certain proportion from KSE and published reports of State Bank of Pakistan<sup>10</sup>. Thus, scope of the current study is different from the multifactor models employed by Merton (1973) and Ross (1976).

## 2. Literature Review

Behavior of stock returns in relation with risk factors has been major focus of the researchers and academicians in the area of financial economics during the last couple of years. The pioneer work relating stock return with risk is studied in terms of Asset Pricing Model of Sharpe (1964), Lintner (1965), and Black et al. (1972). Sharpe, Lintner and Black (SLB) explain the stock return through market risk premium. The capital asset pricing model (CAPM) developed the way for the practitioners to think about the relationship between risk and return.

So far CAPM has been tested empirically by many studies whose findings are diverse. The first study on the CAPM was conducted by Lintner (1965) and Douglas (1967). These studies revealed that the intercept was much bigger than risk free rate and beta had lower value, though statistically significant. Diverse results related to CAPM are attributed to measurement error and data related issues (Miller & Scholes, 1972). Just after one year Fama and MacBeth (1973) performed the standard test of CAPM on portfolio for cross-sectional validation and found out weak significant beta. Findings of these studies do not support CAPM and nor do they support the assumptions of CAPM. Previous studies<sup>11</sup> also reveal security market line which is flatter than the one estimated by the CAPM.

<sup>6</sup> The market momentum is the rate of acceleration of prices over time. The idea behind momentum is that prices are more likely to move in same direction due to acceleration rather than changing the direction that may be required due to any circumstances

<sup>7</sup> Carhart (1997) identified the momentum for the capturing the persistence of returns anomaly

<sup>8</sup> Fama and French (1996) explains that Fama and French model only explains the rational pricing of the stock

<sup>9</sup> Bhandari (1988); Dimitrov and Jain (2008); Gomes and Schmid (2010); Hamada (1972) provides evidence of linkage of market leverage and stock returns

<sup>10</sup> For details visit [www.sbp.gov.pk](http://www.sbp.gov.pk)

<sup>11</sup> For details see literature of Black et al. (1972); Fama and MacBeth (1973)

The failure of CAPM model leads to the development of multifactor model like ICAPM by Merton (1973) and APT by Ross (1976) based on macroeconomic factors, but the pattern of change in macroeconomic variables is much different from the variation pattern of stock returns and capital market-specific factors.

On account of diverse results from the estimation of CAPM, financial economists introduced other factors. Banz (1981) introduced firm size as the factor affecting returns of security. The firm with small size produces higher returns (Fama & French, 1992). Similarly, Bhandari (1988) explains that the leverage effect is also associated with the risk and return. Stattman (1980), Rosenberg et al. (1985) affirm the positive relationship between average return and book to market equity ratio. Basu (1977) finds out significant impact of earning to price ratio (E/P). The results show statistically significant relationship of E/P with returns after controlling firm size and beta.

Ball (1978) introduced the yield surrogates (proxies for identifying underlying risk) for explaining the average returns. Based on the surrogates identified in the literature Fama and French (1992) developed their model. Significant variables of the model which current study has also employed, include capability of size and book to market equity in explaining the cross-sectional variation of expected returns. Fama and French (1992) also included book leverage, and earning to price ratio in explaining the cross sectional variations of the expected return and they found that book to market equity and size both explained the cross-sectional variation in the expected return. The leverage and E/P ratio is by design incorporated when size and book to market equity are used to define the cross-section. The current study employed the two significant variables of the Fama and French (1992) such as HML and SMB along with two other factors for determining stock returns and their effectiveness in the long run. The average stock returns are not positively related to market beta when portfolios are formed based on size and beta (Fama & French, 1992).

Fama and French (1993) investigated the explanatory power of the cross-sectional variation through the variables employed by Fama and French which revealed that maximum variation in stock returns were explained by book to market equity and size. The returns on small stocks are more sensitive to the risk captured by size factor than the returns on big stocks. Further, Fama and French (1995) analyzed the consistency of the behavior of stock-returns in relation to size and BE/ME and behavior of earnings in relation to size and BE/ME. The results show weak consistency especially concerning the value factor which is attributed to the measurement error of the variables. Fama and French (1996) explain the pattern of stock-returns which are not explained by the capital asset pricing models. The CAPM model is unable to explain long term reversal in stock-returns and short term stock-returns. However, the Fama and French three factor model explains much of the anomalies of CAPM model except the continuation of short term returns. The results show that the three factor model explains reversal of long term returns. Yet there are other anomalies which are still unaddressed. These anomalies are beyond the scope of this study.

Many studies like Connor and Sehgal (2001)<sup>12</sup>; Faff (2001); Drew, Naughton, and Veeraraghavan (2003); Prajutasen (2010) and Srimarksuk (2007) generalized Fama and French model in different countries and identified linear exposure of stock returns to market returns, size and value factor. Additionally these studies explain cross-sectional variation in stock returns by employing methodology of Fama and French (1993) model. In contrast, several studies (Clare, Priestley, & Thomas, 1998; Ferson & Harvey, 1999; Kothari, Shanken, & Sloan, 1995; Pham & Long, 2007) have come up with results different from Fama and

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<sup>12</sup> Connor and Sehgal (2001) also shows weak explanatory power of these variables (size, value and market) in explaining earnings growth rate.

French model. Malin and Veeraraghavan (2004) tested the robustness of Fama and French model in the developed countries and revealed growth stocks generating higher returns than the value stocks which is contrary to the Fama and French model. Chang, Johnson, and Schill (2001) revealed significance of SMB and HML in the higher-order systematic co-moments in the cross-sectional regressions for portfolio returns but statistically SMB and HML emerged as insignificant. These studies tested the validity of Fama and French model. However, long run adjustment patterns of risk premium in equity returns need to be addressed. Moreover, these studies on Fama and French model are targeted towards developed markets. The emerging markets may depict different results on size and value effect validity.

Employing Fama and French model is not a common practice emerging markets specifically in south Asian region due liquidity issues (Schoenfeld, 2011; Silva & Chávez, 2008), transaction cost (Bekaert et al., 2007; Lesmond, 2005), and uncertainty in applicability of size and value effect (Zaremba & Konieczka, 2014). However, in late 2000s, researchers have shifted their focus on exploring emerging markets. Barry, Goldreyer, Lockwood, and Rodriguez (2002) investigated 2,000 emerging markets stocks and found robust value effect in emerging markets. (Dimson et al., 2015) also concluded the significance of value effect in emerging markets. These studies explained the validity of size and value effect in emerging markets. However, the long run adjustment patterns of size and value premium in equity returns need to be evaluated in case of emerging markets.

Application of the Fama and French model in different markets also reveal favorable results<sup>13</sup>. However, Fama and French model is unable to explain factors involved in persistence of mutual funds' performance in the short run. Hendricks, Patel, and Zeckhauser (1993), Goetzmann and Ibbotson (1994), Brown and Goetzmann (1995), Grinblatt and Titman (1992), and Wermers (1997) claimed persistence of mutual funds' performance in the short run which can be attributed to the "hot hands" or common investment strategies or asymmetric information.

The inability of the Fama and French model in explaining persistence of returns was also identified in the Fama and French (1996). The anomaly of persistence of returns, which is also known as momentum anomaly, motivated Carhart (1997) to develop extension of three factor Fama and French model by introducing the momentum factors. Evidence of testability of this model is consistent with size, book to market and momentum factor in explaining the persistence of returns. The study recommended that the funds with higher past returns lead to higher than average returns in the following period. The present study tests this lagged effect of the risk premium on the current risk premium by employing autoregressive models. L'Her, Masmoudi, and Suret (2004) explored implications of four factor model of Carhart (1997) in Canada and revealed results consistent with the Carhart four factor model. Cakici et al. (2013) explained the behavior of size, value and momentum in emerging markets. The results, based on 18 countries analysis through regression, suggested the prominence of value effects and big stock shows higher premium than small stocks, which is contrary to Fama and French (1992). This study tested the Carhart Model, but doesn't identify the adjustment pattern of the stock returns towards changes in fundamentals. The present study identifies the adjustment pattern of the stock returns towards market based factors changes. Rouwenhorst (1999) also tested the momentum factor implication in 20 emerging economies and identified similar pattern as that of developed economies. However, their results are based on qualitative analysis. The presents study not only quantifies the impact but identifies the adjustment pattern which (Rouwenhorst, 1999) is unable to identify in their study. The above studies identified that ample work is done on emerging economies but insignificant work is

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<sup>13</sup> Malin and Veeraraghavan (2004), Pham and Long (2007)

done on its adjustment pattern in the long run and their effectiveness in the market.

Financial theorists consider debt as the primary source of financial risk. Previous studies identified diverse findings related to the influence of gearing on stock returns. Modigliani and Miller (1958) (henceforth MM) pointed in first proposition that the returns from real assets affect the value of a firm. Second proposition of MM depicts levered firm value remaining constant, but the cost of equity increasing with increasing risk. Different empirical studies like Hamada (1972), Masulis (1983), Bhandari (1988), Dimitrov and Jain (2008) and Korteweg (2010) provide diverse evidence on gearing and stock returns. Strong and Xu (1997) examined market gearing as directly associated with returns and book gearing as inversely associated with stock returns. Ho et al. (2008) pointed out market gearing revealing conditional pricing relation with returns. Gomes and Schmid (2010) examined positive relation of returns with market gearing but statistically insignificant relation of stock returns with book gearing. Fama and French (1992) explain positive relationship of market gearing with returns, but association becomes negative with adoption of book gearing. George and Hwang (2010) reveal negative relation of gearing with returns because of sensitivity of high levered firms to financial distress risk. Garlappi and Yan (2011) adopts dynamic model to identify the link between distress-risk and asset returns by incorporating gearing and find out gearing explaining stock returns particularly for the firms with high probabilities of default. However, none of these studies identified the market gearing as a price-risk factor. Most of the studies identified relationship between market gearing and stock returns. The market gearing actually depicts the market liquidity of the firm that signals for the future growth of the firm due to growth factor is calculated through market liquidity. These studies are mostly based on developed market so it is required to test the relationship in emerging markets as price risk factor. The tendency of market gearing to explain stock returns as the price-risk factor is still unaddressed.

In the context of previous studies<sup>14</sup> related to the size, value, momentum premiums of multifactor models, the main gap have been identified in term of how equity returns will be adjusted to risk premium in long run (long run adjustment of risk premium in equity returns). As the emerging market as less liquid, so studying the adjustment pattern of risk premiums in equity returns has major implication to existing body of knowledge. Prior studies also explained the market gearing impact on stock returns in developed market but market gearing impact as price risk factor on stock returns of emerging markets need to be addressed. Furthermore, adjustment of equity returns to market gearing effect is also captured in this study. The present study incorporates market value of leverage as the proxy for market gearing. These effects may explain irrational behavior as price risk factor. The long-term relationship reveals consistency of risk premium as response variable to the market premium, SMB, HML, WML and UMD. The present study estimates both the short-term and long-term relationships in order to single out the adjustment process in the long run<sup>15</sup> which further provides efficiency content of the markets. Previous Studies<sup>16</sup> on emerging economies, single out the gap towards studying long term adjustment pattern.

<sup>14</sup> O'Brien et al. (2008), Bundoo (2008), (2008), Pham and Long (2007), Prajutasen (2010), Lam (2005), Connor and Sehgal (2001), Javid and Ahmed (2008). All have either limited samples and / or employed GMM (Generalized Method of moments) model and most of these studies are based on the GRS test.

<sup>15</sup> Previous studies based the long run consistency analysis on the employment of longer time series in the model. However, this is not case as the long run adjustment identifies the long run consistency and adjustments

<sup>16</sup> Iqbal, Brooks, and Galagedera (2008) Testing Conditional Asset Pricing Model: An Emerging Market Perspective. Monash University, Australia (Working Paper 3/08.).



### 3. Methodology

Expected return and risk premium are significantly important for the investors and their estimation has been done by some of the leading studies of fundamental factor models<sup>17</sup> in finance. CAPM, Fama and French (1992) models, and Carhart (1997) four factor models are a few to mention.

This study employs the methodology of Fama and French (1992) in defining the variables. The objective of this study is estimation of long-term consistency of relationship between risk premium and the fundamental factors following the findings of Carhart (1997) wherein stock-returns take significant boost from their lagged values.

Methodologically present study employs one of the efficient models such as the concept of partial adjustment using autoregressive distributed lagged models and Quantile regression method in order to describe long-term consistency and adjustment pattern of stock returns using risk premium. Findings of such models also provide some important implications about efficiency of the markets. The Quantile regression is an attempt to compare variation across various quartiles of the companies through median effect of independent variables on the dependent variable such as risk premium.

Partial adjustment model has been constructed for estimation keeping in view inability of Fama and French (1996) model in explaining persistence of returns (known as momentum anomaly) and introduction of momentum factors by Carhart (1997). Their findings that the funds with higher past returns lead to higher than average returns in the following period justify application of partial adjustment of risk premium using the autoregressive models. Additionally, Quantile regression is employed to see median effect of fundamental factors on the risk premium.

#### 3.1 Partial Adjustment and Autoregressive Model

Considering the adjustment of actual returns ( $Y_t$ ) to the desired returns ( $Y_t^*$ ). Partial adjustment model assumes that actual changes are equal to proportional optimal change. Mathematically relationship of actual and desired returns can be written as

$$Y_t - Y_{t-1} = \lambda(Y_t^* - Y_{t-1}) \dots\dots\dots (1)$$

Where,  $\lambda$  is the adjustment coefficient<sup>18</sup>, which can also be considered as the speed of adjustment. The greater the speed of adjustment, the higher the efficiency and the higher the value of  $\lambda$ . Though traditionally the value of  $\lambda$  cannot be greater than 1 but following findings of Carhart (1997) “that the funds with higher past returns lead to higher than average returns”, the value of adjustment coefficient can be greater than 1.

The desired stock returns can be plotted against independent variables (the factors) as shown in the equation (2).

$$Y_{it}^* = \beta_1 + \beta_2 X_{it} \dots\dots\dots (2)$$

Where the  $X_{it}$  is the independent variable(s) and  $Y^*$  is desired value of the dependent variable. Being noise or friction as component of the market, the gap between actual and

<sup>17</sup> The models that uses observable asset or firm specific variable such as firm size, market value, dividend yield etc. for development of factors is known as Fundamental Factor Models ("Factor Models for Asset Returns," 2006; Zivot & Wang, 2007). This study used established fundamental factor models like CAPM, Fama and French Model, Carhart Four Factor Models, five Factor model based on growth factor)

<sup>18</sup> The adjustment coefficient refers to the rate at which the factor loading adjust in short runs that cumulatively leads to complete adjustment in long run

desired is bound to exist. Incorporating such a market-oriented reality of noise the equation (3) is derived from the first two equations.

$$Y_{it} = Y_{i(t-1)} + \lambda(Y_{it}^* - Y_{i(t-1)}) + \mu_{it} \dots\dots\dots (3)$$

Where,  $\mu_{it}$  is the non-adjusted gap in each period. Putting equation (2) in (3) that is

$$Y_{it} = Y_{i(t-1)} + \lambda(\beta_1 + \beta_2 X_{it} - Y_{i(t-1)}) + \mu_{it} \dots\dots\dots (4)$$

$$Y_{it} = \lambda\beta_1 + \beta_2 \lambda X_{it} + (1-\lambda)Y_{i(t-1)} + \mu_{it} \dots\dots\dots (5)$$

So, the operational expression of the equation 4 can be written according to the variables under investigation.

$$(R_i - R_f)_{it} = \lambda\beta_1 + \beta_2 \lambda(R_m - R_f)_{it} + (1-\lambda)(R_i - R_f)_{i(t-1)} + \mu_{it} \dots (6)$$

$$(R_i - R_f)_{it} = \lambda\beta_1 + \beta_2 \lambda(R_m - R_f)_{it} + \beta_3 \lambda(SMB)_{it} + \beta_4 \lambda(HML)_{it} \dots\dots\dots (7)$$

$$+ (1-\lambda)(R_i - R_f)_{i(t-1)} + \mu_{it}$$

Based on the Carhart (1997) model the momentum factor is incorporated and based on previous studies, the mimic risk factor based on market leverage as proxy for gearing<sup>19</sup> is also incorporated in the model

$$(R_i - R_f)_{it} = \lambda\beta_1 + \beta_2 \lambda(R_m - R_f)_{it} + \beta_3 \lambda(SMB)_{it} + \beta_4 \lambda(HML)_{it} \dots (8)$$

$$+ \beta_5 \lambda(WML)_{it} + (1-\lambda)(R_i - R_f)_{i(t-1)} + \mu_{it}$$

$$(R_i - R_f)_{it} = \lambda\beta_1 + \beta_2 \lambda(R_m - R_f)_{it} + \beta_3 \lambda(SMB)_{it} + \beta_4 \lambda(HML)_{it} \dots (9)$$

$$+ \beta_5 \lambda(WML)_{it} + \beta_6 \lambda(UMD)_{it} + (1-\lambda)(R_i - R_f)_{i(t-1)} + \mu_{it}$$

The equations (8) and (9) provide short-term relationship between the dependent and the independent variables. The long-term relationship can be estimated by dividing each coefficient by the estimated value of  $\lambda$ .

### 3.2 Quantile Regression Analysis

Quantile regression provides estimates of the linear relationship between regressors and a specified Quantile of the dependent variable (Koenker & Bassett Jr, 1978). ‘Least absolute deviations (LAD)’ is one of the special cases of Quantile regression which corresponds to fitting the conditional median of the response variable (the risk premium).

Quantile regression describes better conditional distribution of the response variable than conditional mean in the OLS analysis. Researchers can analyze any selected proportion of the response variable affected by the regressors included in the model. It is robust method of modeling because it is not based on assumptions related to the normal distribution (*i.i.d*).

<sup>19</sup> For theoretical considerations see literature of Garlappi and Yan (2011); Ho et al. (2008); Strong and Xu (1997)

Quantile regression model<sup>20</sup> corresponds to linear regression model as described in (10).

$$(R_i - R_f)_{it} = \beta_1^{(p)} + \beta_2^{(p)}(R_m - R_f)_{it} + \beta_3^{(p)}(SMB)_{it} + \beta_4^{(p)}(HML)_{it} \dots (10) \\ + \beta_5^{(p)}(WML)_{it} + \beta_6^{(p)}(UMD)_{it} + \mu_{it}^{(p)}$$

Where  $0 < p < 1$  indicates the proportion under Quantile at  $p$ . Expected value of the error terms is 0 in linear regression model. Corresponding Quantile regression is shown in equation (11).

$$Q((R_i - R_f)_{it} | (R_m - R_f)_{it}, SMB_{it}, HML_{it}) = \beta_1^{(p)} + \beta_2^{(p)}(R_m - R_f)_{it} + \beta_3^{(p)}(SMB)_{it} + \dots (11) \\ \beta_4^{(p)}(HML)_{it} + \beta_5^{(p)}(WML)_{it} + \beta_6^{(p)}(UMD)_{it}$$

The difference in the error term of the different Quantiles can be written as shown in equation (11)

$$\mu_{it}^{(p)} - \mu_{it}^{(q)} = (\beta_1^{(p)} - \beta_1^{(q)}) + (\beta_2^{(p)} - \beta_2^{(q)})(R_m - R_f)_{it} + (\beta_3^{(p)} - \beta_3^{(q)})(SMB)_{it} + (\beta_4^{(p)} - \beta_4^{(q)})(HML)_{it} \\ + (\beta_5^{(p)} - \beta_5^{(q)})(WML)_{it} + (\beta_6^{(p)} - \beta_6^{(q)})(UMD)_{it} \\ \dots \dots \dots (12)$$

Where  $R_i$  = Stock returns of the  $i^{th}$  company at time  $t$ ,  $R_f$  = Risk free rate,  $R_m$  = Market return of the stock market using KSE 100 Index as proxy,  $SMB$  = Small minus big in terms of size,  $HML$  = High minus low in terms of value factor,  $WML$  = Winner minus Loser in terms of average stock returns at  $t-1$ ,  $UMD$  = Up minus Down in terms of market gearing ratio

Variables used in the model are described in the paragraphs to follow.

### 3.3 Small minus Big (SMB)

Overall value of the firm defines size factor. Fama and French (1992) defined size as the market value of a share (at year end December 31st) times outstanding shares. In this study 'size' variable is represented by the market value of a share (at year end December 31st) times outstanding shares.

The SMB means small minus big stock returns of the portfolio. In other words, SMB is the difference between the stocks returns of the small firms' portfolio and stock returns of the big firms' portfolio. The present study uses the approach of Fama and French (2012) in which the size breakpoints are 3rd, 7th, 13th, and 25th percentiles of the region's aggregate market capitalization, which corresponds to Fama and French (1993)

### 3.4 High minus Low (HML)

The book to market equity ratio is calculated as book value of equity (BE) of the firm divided by market value of equity (ME) of the firm. Fama and French (1992) considered common equity plus deferred taxes as the book value and market price of share as on 30 June (fiscal year end) times the outstanding shares as market value.

The HML variable is developed to incorporate value factor that explains variations in the stock returns. The HML means high minus low, which is, the difference between returns of

<sup>20</sup> For details see literature of Koenker and Bassett Jr (1978)

the portfolio with high BE/ME and the returns of the portfolio with low BE/ME. The portfolios are developed using the approach of Fama and French (2012) in 25 portfolios are sorted through size book to market equity ratio.

### 3.5 Winner Minus Loser

The winner minus loser is developed to incorporate the momentum factor that explains the variations in the stock returns. The WML is the winner minus loser that is the difference between portfolio of top performer stocks and portfolios of lower performer stocks. (Fama & French, 2012) approach is used to develop WML factor by developing 25 portfolio sorted through size and lagged momentum.

According to Carhart (1997), the anomaly of the Fama and French (1992) that is related to persistence of returns that is also known as momentum anomaly due to which the Carhart (1997) developed the momentum factor that leads to further studies in momentum effect (Lee & Cho, 2014).

### 3.6 Up minus Down

The gearing ratio depicts financial risk employed by the firm. The market leverage as proxy for gearing is being calculated as total assets divided by market price of shares (As on Year end December 31<sup>st</sup>) times outstanding shares as calculated in Strong and Xu (1997) and many other studies.

The up minus down is developed to incorporate the impact of firm future growth opportunity that can explain the variations in current stock returns. The UMD is up-minus-down and is the difference between the returns of portfolio of higher market gearing and returns of the portfolio of lower market gearing. The 25 portfolios are developed sorted through size and growth measure, which is consistent to the approach of Fama and French (2012).

According to Strong and Xu (1997) and Gomes and Schmid (2010) the market gearing has impact on stock returns. However, this study identifies whether the market gearing is the price risk factor or not. For this purpose the portfolio are developed on the basis of market gearing and price risk factor is developed in the same manner as in Fama and French (1992). The market gearing actually depicts the market liquidity of the firm that signals for the future growth of the firm due to growth factor is calculated through market gearing or liquidity<sup>21</sup>.

### 3.7 DATA

This study employs 13 year monthly stock prices of 324 companies listed in Karachi Stock Exchange (KSE); 340 companies of BSE included in CNX 500, and 534 companies of SSE included in Shanghai for the period of January-2001 to December-2013. Annual and biannual reports of the companies were quite handy in the construction of SMB and HML. The source of data is Thomson Reuter DataStream Database for India and China, but for Pakistan Annual Reports of the Companies, State Bank of Pakistan, and Thomson Reuter DataStream database were accessed. Long span of the data set provides an opportunity to critically explore application of fundamental factor models under different economic situations.

This is the first study of its kind that not only explains the long-term applicability of Fama and French in emerging economies but also attempt to capture maximum anomalies of the model. The emerging countries selected in sample are India, China and Pakistan because of

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<sup>21</sup> In analysis, the term liquidity and growth is used interchangeably

similar investment pattern in these countries at the start of their journey of growth fifteen years ago. Little empirical work is found on the applicability of Fama and French model in these emerging economies which motivated the selection of these countries in the sample. Moreover, these countries are the major players of the South Asia and their economic importance cannot be ignored. Based on the described criteria, cumulatively the sample of 1198 companies are incorporated in the sample over the period of 2001-2013 that leads to 185,690 observations or data points on the basis of which results are estimated.

#### 4. Analysis of Results

Findings from the estimation of the models discussed in the previous section are presented in this section. Results of the estimated Quantile regression using median as the criterion are also analyzed in this section. Short-run causal relationship of risk premium and the factors such as SMB, HML, WML and UMD are explained from the results depicted in table 1. The long-term relationship of the same variables is described from the results presented in table 2. Table 3 indicates results of the Quantile regression. Five determinants of risk premium are addressed in this study. These five determinants represent five different stages of development of capital market theories. The market premium represents Sharpe (1964), Lintner (1965), and Mossin (1966). The Fama and French (1992) model is represented by additional two factors such as size factor (SMB) and value factor (HML). The model of Carhart (1997) introduces momentum factor (WML) and Ross (1976) model adds one more factor known as firm specific growth factor (UMD). The short run estimation of required rate of return has been shown from CAPM (1) through FF Model (2), four Factor model (3), and firm specific growth factor (4), for China, India and Pakistan.

In all the three countries, CAPM stock returns are significantly explained by the market risk premium ( $p < 1\%$ ) but the value of beta is less than 1 ( $\beta < 70\%$ ) in Pakistan and China whereas it is higher than 1 for India. Overall performance of the securities in the markets of China and Pakistan is defensive instead of aggressive. On the contrary performance of securities in India looks aggressive based on value of CAPM-beta greater than 1 on the average.

The stock returns are explained in Pakistan and China by the market risk premium of almost 67% and 61% respectively indicating less sensitivity of excess returns towards market risk premium in these two countries. Volatility of the risk premium is relatively higher in India than the other two countries where premium has been comparatively stable during the period from 2001 to 2013.

Regarding the Fama and French (FF) model, SMB-beta is significant ( $p < 1\%$ ) with a negative sign in Pakistan only. The value of SMB-beta reveals bigger firms accruing better risk premium than the smaller ones in Pakistan (Faff, 2001; Gustafson & Miller, 1999). India and China have received positive and significant value of the SMB-beta representing results as per findings of the Fama and French (Fama & French, 1992, 1993) that the smaller firms outperform in terms of risk premium than the larger ones<sup>22</sup>.

The HML-beta is insignificant with negative sign in India reflecting value (factor) of the big firm having insignificant role in the determination of risk premium. However, HML-beta is significant with negative sign for the stock market of China and Pakistan in all the models from (2) through (4). These results clearly represent growth of the Chinese markets to considerable maturity level. During the growth of firms, risk premium is negatively affected. Inverse relationship of value and risk premium is also reiterated from the models which

<sup>22</sup> With the purpose to identify the other environmental factor impact, the data is dissected in to two portion and estimated individually. The results remains the same under both segments.

include momentum factor (WML) and firm specific growth factor (UMD) (Chen & Zhao, 2009; Daniel & Moskowitz, 2013; Ho et al., 2008). The negative UMD is consistent with the notion that investors require greater return on assets with less market liquidity to reimburse them for the substantial cost of trading these assets (Ibbotson, Chen, Kim, & Hu, 2013). The value of HML-beta is positive and significant on the 4<sup>th</sup> model which include firm specific growth (UMD) and momentum (WML) factors. It means Pakistani security markets return positive premium to the investors from the growth of their business in the event of momentum and the value factors.

Significance of the HML-beta in the presence of WML factor is supported from the positive and significant values of WML-beta and UMD-beta in the models 3 and 4 for Pakistani security markets where (p-value < 1%) in the Carhart (1997) model and multifactor model (Agarwal & Poshakwale, 2010; Asness, Moskowitz, & Pedersen, 2013). It can be concluded that rising leverage in fact causes an increase in the risk whereby expected returns are increased (Ho et al., 2008).

In Model (3) and (4) the WML-beta is -0.022 and -0.024 (with p-value < 1%). Momentum factor is also negative and significant for China. This negative and significant relationship is against the findings of Carhart (1997). This situation is possible under only two scenario. First, either market is illiquid i.e. focusing on looser stock, the market illiquidity has progressive effect on it and vice versa is correct for winner stocks. When the market is illiquid the high trading cost reduces investor eminence. Subsequently, the broaden illiquidity gap among winner and looser intend the looser portfolio to earn higher return to recompense for illiquidity (Acharya & Pedersen, 2005). The second condition is that the volatile bearish market is depicted by negative beta of WML, which illustrates that WML efficiently short volatility in panic period (e.g. Grundy and Martin (2001)). So, it can apparently inferred that the sample period under consideration is panic period in Indian market and behavior of WML in such case is like short call option but only in panic periods (Daniel & Moskowitz, 2013).

Comparative analysis of the three countries indicates required rate of return of India being highly sensitive to market risk and inelastic to value, size, momentum, and growth beta<sup>23</sup>. This may be attributed to attitude of investors who deliberately follow market risk rather than value, size, momentum and firm specific growth for the estimation of required rate of return. In case of China the stock returns are affected by market risk, size, value, momentum and firm specific growth factors. Such a mature attitude of the investors reflects established stock markets of China which is more efficient than the Indian and Pakistani markets.

The diagnostics such as standard error of regression, values of AIC and SBC are on the lower side which is favorable reflection of the models in terms of fitness. Significance of the F-stats shows justifies the relationship among dependent and independent variables.

The long run relationship of risk premium and its determinants (factors) are explained from the results shown in Table 2. As discussed in the section related to the methodology, long run is the period indicating adjustment which takes place in many short runs. The value adjustment parameter ( $\lambda$ ) in all the models is more than unity. Carhart (1997) recommended that the funds with higher past returns lead to higher than average returns in the following period. This justifies the value of adjustment parameter ( $\lambda$ ) greater than 1.

Results presented in table 2 reveal reduced value of the intercepts in the long run. As the value of intercept tends to zero the models are validated in the three markets of China, India and Pakistan. Values of the short run risk factors are also stabilized in the long run that is why their absolute values are reduced in the long run. Sensitivity of stock returns towards factors

<sup>23</sup> Firm Specific growth Coefficient is refer to as Growth beta

is normalized in long run. The difference in short term and long term coefficient seems to be small because the difference only shows adjustment in one month. However, the cumulative adjustment over the year is quite substantial.

Long run results show that the investors give considerable importance to market risk for the estimation of stock returns in rather than size, value, momentum, and growth beta in Pakistan. The betas of size, value, momentum, and growth are further reduced in long run depicting that value of stock is explained by market risk in the long run.

Very high sensitivity of Indian market beta in the short run is reduced from an average value of 1.015 to 0.996 in the long run. The Indian market risk beta still remains major factor explaining stock returns in the long run. Here again relatively less weight is assigned by the Indian investors to size, value, momentum, and firm specific growth factors. The abnormal returns are also reduced in the long run in the Indian stock markets.

The abnormal returns are also reduced in long run in the Chinese stock markets because results are normalized in the long run. However, significance of all the factors affecting risk premium remains the same. These findings unequivocally reflect maturity of investors in the Chinese markets which have grown up during the period of study.

Results of Quantile<sup>24</sup> regression with conditional median are presented in table 3. The resulting betas of the factors under consideration (MPREM, SMB, HML, WML, and UMD) are different from the factor loadings discussed above in estimating median stock returns. In case of Pakistan, the estimate of SMB-beta is significant with positive values of 0.011, 0.008, and 0.026 in the three models. These values indicate positive risk premium attached to small firm due to higher risk of default. Similarly, the HML remains significant at median stock returns with negative sign indicating growth stock outperforming the value stock in Pakistan. The UMD retains price risk factor for median stock returns. The fluctuation in stock returns is generally explained by market risk beta despite the fact that other factors are significant but with lower values. The negative and significant value of WML-beta in India retains volatility and bearish market attitude. More or less results of the Quantile regression are consistent with the findings discussed earlier.

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<sup>24</sup> The robustness of the coefficients is tested through Wald Coefficient restriction test, which identified that coefficients depicts true effects of the factor on stock returns. The results are not reported due to space saving purpose

**TABLE 1: SHORT RUN RELATIONSHIP**

This table presents the short run relationship of stock returns with asset pricing factors based on fundamentals. The fundamental factor models that are estimated for studying short run relationship are CAPM (1), FF-Model (2), Carhart four Factor Model (3), and four factor model with firm specific growth factor (4). These models are estimated for India, Pakistan and China. The MPREM is the market premium, SMB is size factor, HML is value factor, WML is momentum factor, and UMD is firm specific growth factor.

<u>Variables</u>	<u>Pakistan</u>				<u>India</u>				<u>China</u>			
	1	2	3	4	1	2	3	4	1	2	3	4
<b>Constant</b>	-0.060 (-32.7**)	-0.059 (-32.4**)	-0.070 (-33.8**)	-0.068 (-33.1**)	0.002 (1.90)	0.004 (5.06**)	0.009 (8.40**)	0.009 (8.44**)	-0.027 (-50.0**)	-0.025 (-48.6**)	-0.022 (-30.8**)	-0.025 (-33.4**)
<b>MPREM</b>	0.654 (45.2**)	0.665 (45.5**)	0.636 (42.8**)	0.665 (44.8**)	1.015 (134.4**)	1.082 (120.8**)	1.075 (119.6**)	1.064 (108.0**)	0.614 (112.8**)	0.558 (105.2**)	0.559 (105.4**)	0.551 (103.3**)
<b>SMB</b>	- (-9.13**)	-0.042 (-9.17**)	-0.042 (-9.17**)	0.017 (3.16**)	- (26.0**)	0.143 (26.84**)	0.149 (26.84**)	0.144 (24.4**)	- (73.19**)	0.415 (70.2**)	0.407 (71.6**)	0.421 (71.6**)
<b>HML</b>	- (-2.15*)	-0.015 (-2.03*)	-0.014 (-2.03*)	0.017 (2.44*)	- (-1.28)	-0.008 (-1.20)	-0.007 (-1.20)	-0.012 (-1.88)	- (-23.1**)	-0.138 (-23.1**)	-0.137 (-23.1**)	-0.104 (-16.2**)
<b>WML</b>	-	-	0.027 (10.8**)	0.013 (5.29**)	-	-	-0.024 (-7.10**)	-0.027 (-7.58**)	-	-	-0.022 (-6.64**)	-0.024 (-7.05**)
<b>UMD</b>	-	-	-	-0.110 (-20.6**)	-	-	-	0.014 (2.68**)	-	-	-	-0.089 (-13.8**)
<b>S.E. Regression</b>	0.260	0.260	0.259	0.258	0.141	0.140	0.140	0.140	0.1301	0.1251	0.1251	0.1250
<b>AIC</b>	0.145	0.141	0.139	0.129	-1.081	-1.095	-1.096	-1.096	-1.240	-1.318	-1.318	-1.321
<b>SBC</b>	0.146	0.142	0.140	0.130	-1.081	-1.094	-1.095	-1.095	-1.239	-1.317	-1.318	-1.320
<b>DW Stat</b>	2.100	2.095	2.096	2.105	2.055	2.057	2.057	2.058	2.084	2.120	2.122	2.126
<b>F-Stats</b>	1890.2**	990.60**	818.0**	760.00**	8923.8**	4703.19**	3776.42**	3148.62**	6402.4**	5128.8**	4114.0**	3468.1**

\* Significance at 5% level

\*\* Significance at 1% level

The models that are estimated in above table are

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \mu_{it} \quad (1)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \beta_4(WML)_{it} + \mu_{it} \quad (3)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \mu_{it} \quad (2)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \beta_4(WML)_{it} + \beta_4(UMD)_{it} + \mu_{it} \quad (4)$$



**TABLE 2: LONG RUN RELATIONSHIP**

This table presents the long run relationship of excess returns and asset pricing factor based on fundamentals. The short run results are adjusted through adjustment coefficient ( $\lambda$ ) for attaining long run relationships and patterns. The patterns of significance remains the same. However, the factor loadings varies among short run and long run depicting vital implication to relationships. Where MPREM is the market premium, SMB is small minus big, HML is high minus low, WML is winner minus loser, UMD is up minus down.

<u>Variables</u>	<u>Pakistan</u>				<u>India</u>				<u>China</u>			
	1	2	3	4	1	2	3	4	1	2	3	4
<b>Constant</b>	-0.049 (-32.7**)	-0.049 (-32.4**)	-0.058 (-33.8**)	-0.056 (-33.1**)	0.001 (1.90)	0.004 (5.06**)	0.009 (8.40**)	0.009 (8.44**)	-0.024 (-50.0**)	-0.022 (-48.6**)	-0.020 (-30.8**)	-0.022 (-33.4**)
<b>MPREM</b>	0.542 (45.2**)	0.551 (45.5**)	0.528 (42.8**)	0.552 (44.8**)	0.996 (134.4**)	1.058 (120.8**)	1.051 (119.6**)	1.041 (108.0**)	0.551 (112.8**)	0.492 (105.2**)	0.494 (105.4**)	0.486 (103.3**)
<b>SMB</b>	-	-0.035 (-9.13**)	-0.035 (-9.17**)	0.014 (3.16**)	-	0.140 (26.0**)	0.146 (26.84**)	0.141 (24.4**)	-	0.366 (73.19**)	0.360 (70.2**)	0.372* (71.6**)
<b>HML</b>	-	-0.012 (2.15*)	-0.011 (-2.03*)	0.014 (2.44*)	-	-0.008 (-1.28)	-0.007 (-1.20)	-0.011 (-1.88)	-	-0.121 (-23.1**)	-0.121 (-23.1**)	-0.092* (-16.2**)
<b>WML</b>	-	-	0.022 (10.8**)	0.011 (5.29**)	-	-	-0.024 (-7.10**)	-0.026 (-7.58**)	-	-	-0.020 (-6.64**)	-0.021 (-7.05**)
<b>UMD</b>	-	-	-	-0.091 (-20.6**)	-	-	-	0.014 (2.68**)	-	-	-	-0.078 (-13.8**)
<b>S.E. Regression</b>	0.260	0.260	0.259	0.258	0.141	0.140	0.140	0.140	0.1301	0.1251	0.1251	0.1250
<b>AIC</b>	0.145	0.141	0.139	0.129	-1.081	-1.095	-1.096	-1.096	-1.240	-1.318	-1.318	-1.321
<b>SBC</b>	0.146	0.142	0.140	0.130	-1.081	-1.094	-1.095	-1.095	-1.239	-1.317	-1.318	-1.320
<b>DW Stat</b>	2.100	2.095	2.096	2.105	2.055	2.057	2.057	2.058	2.084	2.120	2.122	2.126
<b>F-Stats</b>	1890.2**	990.60**	818.0**	760.00**	8923.8**	4703.19**	3776.42**	3148.62**	6402.4**	5128.8**	4114.0**	3468.1**

\* Significance at 5% level

\*\* Significance at 1% level

The models that are estimated in above table are

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \mu_{it} \quad (1)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \beta_4(WML)_{it} + \mu_{it} \quad (3)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \mu_{it} \quad (2)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \beta_4(WML)_{it} + \beta_4(UMD)_{it} + \mu_{it} \quad (4)$$

**TABLE 3: QUANTILE REGRESSION (Median)**

This table presents Quantile regression at median that identifies the impact of fundamental pricing factors on the conditional median of excess returns. This provide complete picture of distribution of excess returns over time series. The model characteristics like sparsity, standard error of regression and significant Quasi LR stat shows the goodness of fit of the model. Where MPREM is the market premium, SMB is small minus big, HML is high minus low, WML is winner minus loser, UMD is up minus down.

<u>Variables</u>	<u>Pakistan</u>				<u>India</u>				<u>China</u>			
	1	2	3	4	1	2	3	4	1	2	3	4
<b>Constant</b>	-0.065 (-67.8**)	-0.064 (-64.6**)	-0.067 (-68.1**)	-0.065 (-62.2**)	-0.008 (-11.9**)	-0.006 (-8.53**)	-0.002 (-1.93)	-0.002 (-2.0*)	-0.002 (-4.97**)	-0.027 (-50.4**)	-0.025 (-35.6**)	-0.025 (-35.4**)
<b>MPREM</b>	0.458 (48.1**)	0.461 (47.6**)	0.456 (47.82**)	0.463 (47.3**)	0.933 (115.2**)	0.973 (104.2**)	0.971 (105.2**)	0.966 (102.3**)	0.530 (78.8**)	0.464 (67.6**)	0.465 (67.2**)	0.462 (67.3**)
<b>SMB</b>	-	0.011 (4.02**)	0.008 (4.57**)	0.026 (8.94**)	-	0.084 (15.69**)	0.092 (16.62**)	0.089 (16.29**)	-	0.377 (57.7**)	0.373 (56.7**)	0.374 (56.6**)
<b>HML</b>	-	0.007 (2.52**)	0.009 (3.30**)	0.017 (5.19**)	-	-0.006 (-1.02)	-0.006 (-0.97)	-0.008 (-1.35)	-	-0.162 (-24.5**)	-0.160 (-23.1**)	-0.150 (-21.0**)
<b>WML</b>	-	-	0.009 (8.24**)	0.004 (2.82**)	-	-	-0.022 (-7.38**)	-0.023 (-7.41**)	-	-	-0.019 (-5.62**)	-0.021 (-6.07**)
<b>UMD</b>	-	-	-	-0.022 (-8.11**)	-	-	-	0.007 (1.33)	-	-	-	-0.034 (-4.14**)
<b>Sparsity</b>	0.204	0.213	0.209	0.213	0.238	0.237	0.236	0.236	0.253	0.236	0.237	0.237
<b>S.E. Regression</b>	0.260	0.260	0.260	0.259	0.140	0.140	0.139	0.139	0.131	0.126	0.126	0.126
<b>Quasi LR Stat</b>	5354.5**	5213.8**	5387.0**	5382.3**	16619.0**	17008.5**	17107.5**	17137.9**	8415.9**	15130.5**	15113.5**	15092.5**

\* Significance at 5% level

\*\* Significance at 1% level

The models that are estimated in above table are

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \mu_{it} \quad (1)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \beta_4(WML)_{it} + \mu_{it} \quad (3)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \mu_{it} \quad (2)$$

$$(R_i - R_f)_{it} = \beta_1 + \beta_2(R_m - R_f)_{it} + \beta_3(SMB)_{it} + \beta_4(HML)_{it} + \beta_4(WML)_{it} + \beta_4(UMD)_{it} + \mu_{it} \quad (4)$$

## 5. Conclusion

This study examines the long-term consistency of fundamental factor models based on adjustment in the short run, in the emerging markets of China, India and Pakistan. This study also examines the firm specific growth factor measured by market leverage as a price risk factor explaining stock returns. The empirical findings of this study identify that factor based on market leverage is the price risk factor due to significant growth beta. The long-term consistency suggests that market momentum, is high enough to overestimate the coefficients in short run which are later, stabilized or adjusted in the long run. The stock returns in the short run might be over-estimated which are normalized in the long run. The long-term risk premium can be considered as effective required rate of return. Results of the quantile regression retain similar relationship of the required rate of return and the risk factors identified by the classic contribution of Sharpe (1964), Lintner (1965), Mossin (1966), Fama and French (1992), Carhart (1997), and Ross (1976). Additionally, coefficients of quantile analysis are slightly different from the other models. The difference may be due to non-normality of the stock returns from the selected time series.

The study provides unique behavior related to emerging economies in application of Fama and French (1992) and Carhart (1997) and addition of firm specific growth factor. This study identifies size beta being positively associated with excess returns in emerging economies. The premium is attached to small firms due to higher default risk rather than poor earning in the depression as mentioned Fama and French (1993). Moreover, the value beta is found as either insignificant or negatively associated with stock returns. Growth stocks outperform value stocks in these markets. Emerging economies suffer from long bearish trend that leads to negative momentum beta depicting volatile and bearish markets. The negative growth beta also depicts longtime down market spans in emerging economies as characterized by literature related to the emerging economies.

The study supports Fama and French (1998) that claimed that the emerging economies has value premium and results are consistent with O'Brien et al. (2008) and Connor and Sehgal (2001). These results are inconsistent with the studies based on developed countries (Chang et al., 2001; Malin & Veeraraghavan, 2004). This study provides the new insight to asset pricing models based on market specific and company specific factors, in the categories of fundamental factor models. This study identifies firm specific growth factor as price risk factor that may lead investor irrationality. However, there are also factors which explain excess returns. The unusual behavior of HML factor also provides dissection of value factor in the emerging economies of China, India and Pakistan.

Using the concept of Fama and French hypothesis, required rate of return is to be compared with market portfolio returns. According to the principle of high risk associated with high returns, small value happens to deliver higher returns with higher volatility and growth stocks outperform value stock in emerging economies. This risk-return relationship elucidated by Fama and French model might be very useful for medium and long term investors. In sum, small cap stocks have higher average returns than large cap stocks. China has been observed as one of the most stable market among all the three economies of India, Pakistan and China where all the risk factors play their role to determine risk premium. Contrary to this, risk premium is mostly determined by the market risk factor in India and Pakistan. Effective policy measures should be taken to bring maturity and efficiency in the Indian and the Pakistani markets.

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